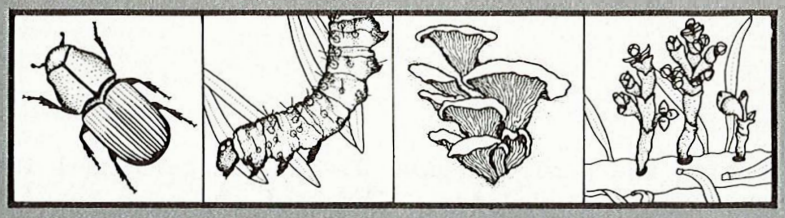
Forest Pest Management



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EVALUATION OF SPRUCE BEETLE IN THE BLUE JOE CREEK DRAINAGE
BONNERS FERRY RANGER DISTRICT, IDAHO PANHANDLE NATIONAL FORESTS
1981

by

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INTRODUCTION

On August 24, 1981, Ken Gibson and Bob Oakes, Forest Pest Management, met with Karl Brauneis, Bonners Ferry Ranger District, to discuss the current spruce beetle infestation in the Blue Joe Creek drainage. Within the drainage, approximately 3,000 acres of spruce and mixed species forest types are affected to a greater or lesser degree by the building spruce beetle epidemic. The current infestation is a result of large amounts of spruce blowdown which apparently occurred in the drainage during both 1978 and 1979. Presently two areas, totaling slightly more than 200 acres, are the most seriously affected. Other smaller groups are also infested. In addition, scattered mortality can be found in much of the spruce type throughout the remainder of the drainage.

Recent Stage I inventories indicate there is approximately 30 MMBF of merchantable spruce in the drainage. At the present time, slightly less than half of that has been killed by the beetle. Virtually all of the remaining live spruce are over 12 inches d.b.h.

Historically, the spruce beetle has proven to be the most damaging insect pest to Engelmann spruce forests in the Rocky Mountains. Infestations of the beetle have resulted in as much as 90 percent of the mature spruce being killed over vast acreages. Yet, for all its potential as a tree killer, the spruce beetle is, under normal conditions, a relatively nonagressive attacker. It prefers downed or weakened material to thrifty, vigorous trees. In endemic situations, the beetle survives in windthrow, logging slash, ice breakage, etc. All known major outbreaks of the beetle have, in fact, resulted from such stand disturbances on a scale large enough to produce abnormally high numbers of attacking beetles.

Green stand data indicate a significant threat exists to the remaining green, standing spruce in Blue Joe Creek drainage--as well as adjacent areas. Impinging upon the need to reduce beetle populations, which implies removal of infested and susceptible mature spruce, however, is the classification of the area as critical habitat for both the grizzly bear and the woods caribou.

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METHODS

During the period August 25-27, FPM personnel inspected several of the infested areas in the drainage. Three of the more heavily infested were sampled to assess beetle-caused mortality. In each of the three areas, 1/10-acre, fixed radius plots were established. On each plot we tallied all beetle-attacked trees, recording them by d.b.h., categorizing dead trees by year of attack, and noting unsuccessful and partial attacks.

Those trees identified as "current attacks" were attacked during the summer months of 1981. Such trees had pitchtubes and boring dust and contained live brood in the larval stage of development. Trees noted "year old attacks" were those attacked during the summer of 1980. They usually showed evidence of woodpeckering and contained recently matured, overwintering adults beneath the bark at their bases. Year old attacks were further distinguished by having a "faded" appearance in that needles had yellowed and were beginning to drop from the tree. Current attacks, on the other hand, are indistinguishable from healthy, green trees by foliar characteristics. "Older dead" trees were those from which all brood had emerged and from which most or all needles have dropped. "Unsuccessful attacks" were trees with pitch tubes on the bole, but in which no brood developed. Finally, "strip attacks" were those successfully attacked on one or more sides, but not completely around the bole. These trees produce brood but remain alive because the tree is not completely girdled during larval development.

To help assess developing brood population, we removed bark samples from infested trees and made larval counts on each plot containing currently infested trees. Bark samples were 6 inches by 6 inches, removed at breast height, from the north and south side of each tree. All larvae (or other developmental stage where encountered) were counted. Both live and dead larvae were tallied. Where we could ascertain mortality factors (parasites, predators, etc.) we noted them.

RESULTS AND DISCUSSION

The following table contains our survey results:

Spruce Mortality Surveys, Blue Joe Creek, August 1981
(All figures in trees/acre)

Area	Current attacks (1981)	Year-old attacks (1980)	Older dead (standing dead)	Unsuccessful attacks	Strip attacks
Stand 702-2-65 (15 plots)	8.7	8.0	6.0	7.4	2.7
Stand 702-1-50 (10 plots)	12.0	16.0	--	18.0	4.0
Stand 702-2-66 (10 plots)	--	13.0	1.0	4.0	1.0

Results of brood sampling from the first two areas sampled are as follows:

Stand 702-2-65.--24 samples removed, a total of 1,159 live larvae found, an average of 48.3 larvae per sample.

Stand 702-1-50.--28 samples, 1,243 live larvae, 44.4 per sample.

(Stand 702-2-66.--None were obtained since no 1981 attacked trees were found.)

Research indicates as few as 169 total larvae in 24 samples and 187 in 28 samples represent increasing beetle populations (Knight 1960).

Spruce beetles normally require 2 years to complete their development. Trees are attacked beginning in June during a typical year. Eggs laid at that time hatch in a few weeks and the developing larvae feed in the tree's phloem throughout that summer. As winter approaches the larvae cease feeding and become dormant until the following spring. During their second summer they complete their larval development, pupate, and become adults by late summer. By the end of that season these new adults emerge from beneath the bark where they completed their development and re-enter the base of those same trees to pass the winter. The next summer (or late spring) these adults emerge to initiate new attacks--2 years after their development began.

Often, in a given area, only one beetle brood at a time will be found. In Blue Joe Creek, however, overlapping broods, resulting from 2 successive years of blowdown, can be found. This obviously compounds the problems associated with efforts to reduce beetle populations.

MANAGEMENT ALTERNATIVES

Management of spruce stands to reduce or eliminate beetle infestations may entail several approaches depending upon existing beetle populations. When beetle numbers are low or nonexistent, stands should be hazard rated according to the system developed by Schmid and Frye (1976). This will enable the manager to concentrate his efforts on those stands presenting the highest risk of infestation. For stands already infested, as are those in Blue Joe Creek, management alternatives are reduced. Schmid and Frye (1977) maintain that for infested stands, if the allowable cut in a given stand is more than the basal area represented by all infested and susceptible spruce, all those trees should be removed. If total basal area of infested and susceptible spruce is greater than the recommended cut, the manager has three options: remove all susceptible trees; remove the recommended basal area in infested, susceptible trees, accepting the risk of future losses; or leave the stand uncut. If the stand is left uncut, probably less than half the residual basal area would be killed; however, the surviving spruce would be of small diameter. Guidelines for harvesting practices are detailed by Schmid and Frye in their publication "Spruce Beetle in the Rockies." Their recommendations should be closely adhered to.

Ken Gibson met with the interdisciplinary team discussing management alternatives on September 15-16. The maintenance of wildlife habitat was of primary concern, and management of the spruce beetle infestation and attendant timber harvesting

were secondary. With those constraints in mind, the interdisciplinary team arrived at a wildlife/spruce bark beetle compromise alternative (Alternative E). The various units described and their prescriptions under that alternative, along with comments from an entomological perspective, are outlined below:

Unit 1 (75 acres).--Remove infested spruce. Complete removal of infested spruce will help to eliminate beetle populations. Marking of infested trees and subsequent removal must be thorough to be effective. Leaving susceptible spruce will leave the stand with high potential for future mortality. In addition, opening the stand will increase the likelihood of future blowdown. The unit will have to be closely monitored and newly attacked trees should be removed prior to beetle emergence. Blowdown could be left to act as trap trees, then removed once infested.

Unit 2 (90 acres).--Clearcut and broadcast burn. Plant with one-third larch, one-third spruce, and one-third subalpine fir. This is the best alternative for this stand. It is one of the more heavily infested by the beetle. The remaining green stand is bigger, older spruce, which is most susceptible to the beetle. In addition, if only the infested trees were removed, those few trees remaining would be highly subject to windthrow. In removing those trees, care should be taken to cut stumps as low as possible and to properly treat slash to avoid beetle buildups in piled slash. Broadcast burning the area should help eliminate those problems. Planting a species mix in the area will help prevent such large scale beetle infestations in the future.

Unit 3 (1,000 acres).--Salvage dead and infested spruce. Spot dozer pile. Plant one-third larch, one-third spruce, and one-third subalpine fir in areas of heavy mortality. The best treatment for this area from a beetle management standpoint would be to remove all susceptible spruce as well as those infested. Because of wildlife considerations that option has been reduced to removal of only dead and infested spruce. To satisfactorily treat the area, removal of infested spruce must be thorough. An additional safeguard would be the felling of trap trees at one-eighth mile intervals along any roads that will be established Trap trees should be some of the larger ones in the stand and should be dropped in 2- to 4-tree groups. Shading of the trap trees is imperative for success. They should be neither limbed nor bucked. Dropping them along established roads would facilitate their removal. Trap trees felled in early spring 1982 would have to be removed prior to June 1984. Trap trees would attract beetles from infested trees missed or from areas not treated. They would be especially beneficial in attracting beetles out of Unit No. 8, and would eliminate the need for their use in that unit. Because of overlapping broods, a trap tree program may be needed for 2 successive years. The need for such a program for a second year will have to be determined next year following a close inspection of the stands. A caution in the use of trap trees is that often standing trees around the trap tree cluster will be attacked. Should this occur, those trees should be removed when the trap trees are. Finally, dozer piling the slash from these areas can be used as beetle attractants as well. Such slash should be left until after beetle flight in 1982, then burned prior to spring 1984.

Unit 4 (760 acres).--Salvage recently dead subalpine fir and infested spruce. In this unit, where less spruce is found, this prescription will help further reduce spruce beetle populations. As previously mentioned, however, care must be

taken to cut spruce stumps as low as possible (less than 18 inches). In this unit slash treatment should take place at time of cutting. Since it will not be piled, no slash should be left on the ground larger than 3 inches at the biggest end. Large limbs and tops should be removed since future entry into the unit is not anticipated.

Unit 5 (100 acres).--Remove all spruce over 12 inches. Remove all infested spruce under 12 inches. Spot dozer pile. Plant one-third larch, one-third spruce, one-third subalpine fir. Since these units will essentially be small clearcuts (or nearly so), comments pertaining to Unit No. 2 are applicable. Here, however, instead of broadcast burning, slash will be dozer piled. Such piles should be treated after they have been infested, as previously described.

Unit 6 (300 acres).--Remove all spruce. This unit, comprised primarily of cedar, will have all spruce removed as a preventive measure. Since only one entry into the unit is anticipated, stumps and slash should be treated as outlined in the discussion for Unit No. 4.

Unit 7 (490 acres).--Salvage all species. Little spruce is found in this unit; it is largely lodgepole pine and subalpine fir. Small amounts of spruce are found throughout. In salvaging dead and infested material of all species, proper slash treatment will be imperative. In this unit, improper slash treatment could not only aggrevate the spruce beetle problem, it could create one with pine engraver beetles in the lodgepole pine. Lodgepole pine slash should not be created prior to September nor after January unless treated promptly. Treatment could consist of lopping and scattering since burning is not usually an alternative during the spring and summer months.

Unit 8 (125 acres).--Remove infested spruce only. Spot dozer pile. Plant with one-third larch, one-third spruce, one-third subalpine fir. Fell trap trees. This unit has been identified as one of the most critical for caribou in the area. For this reason, only infested spruce will be removed. Slash will be piled, then burned after it is infested. We had discussed the use of trap trees in this unit; however, if thorough removal of infested trees is accomplished, if slash is properly treated, and if trap trees are utilized in Unit No. 3, they wouldn't have to be used in this unit. That would help maintain more of the standing trees in this critical area.

Unit 9 (50 acres).--Remove infested spruce. Stage I data for this unit indicated most of the spruce is infested by beetles. Since much of that will be removed, harvesting practices previously discussed will be appropriate in this unit.

Unit 10 (15 acres).--Recommendation pending. This unit, like Unit No. 8, has been identified as being particularly critical for caribou. It also is one of the more heavily infested areas in the drainage. Assuming that, at the least, the infested spruce will be removed, previous comments regarding stumps and slash will apply in that unit.

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